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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/673,683

09/29/2003

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15689.49.1

4169

7590

07/21/2010

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EXAMINER

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ART UNIT

PAPER NUMBER

2611

MAIL DATE

DELIVERY MODE

07/21/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 10/673,683
Filing Date: September 29, 2003
Appellant(s): NAKAMURA ET AL.

Thomas M. Bonacci
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 16, 2010 appealing from the Office action mailed August 4, 2010.

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(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 5-10.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

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(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

5,914,959	Marchetto	June 1999
5,901,185	Hassan	May 1999
5,734,647	Yoshida et al	March 1998

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

I) Claims 5-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Marchetto et al (US 5,914,959) in view of Hassan (US 5,901,185).

Marchetto et al discloses a communication system and method, comprising a transmission apparatus (base station) for transmitting a signal at plural types of transmission rates (highest bit rate and lower bit rate, see Abstract), and a reception apparatus (mobile paging unit) for receiving the transmitted signal, wherein:

the transmission apparatus comprises:

signal generation means for generating a signal (Information Symbols) to be transmitted into which pilot symbols (Periodic Pilot Symbol Block) which are predetermined patterns have been inserted (see Fig.1A),

transmission means (see Fig.3) for transmitting the generated signal, and

the reception apparatus comprises:

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reception means for receiving the transmitted signal; and

coherent detection means (33 in Fig.2) for carrying out coherent detection by using the pilot symbols (Pilot symbol block processor 31 in Fig.2) included in the received signal. Although the term "coherent detection" is not used in Marchetto et al, it actually teaches coherent detection at col.6:16-27, where pilot symbols are used to provide a channel impulse response estimate, which in turn is used for the coherent demodulation. For example, see US Patent No.5,734,647 at col.11:10-18, describing that the periodic insertion of pilot symbols enables a coherent detection at a receiver.

Marchetto et al teaches different transmission rates. But the patent fails to teach that the ratio of the number of the pilot symbols to the total number of symbols in a single slot of the signal becomes smaller when the transmission rate is higher than when the transmission rate is lower. Hassan teaches that an appropriate (in other words, optimal) number of pilot symbols should be selected for reducing the bit error rate and, at the same time, the overhead. See col. 4:48-64. It is quite established that it is desirable to minimize the number of pilot symbols (which carries no user information) in order to reduce overhead. Thus, when a same number of pilot symbols is used for high and low transmission rates, the ratio of the optimized number of pilot symbols to the total number of symbols (including data symbols and pilot symbols) would have been smaller when the transmission rate is higher. Thus, it would have been obvious to one skilled in the art at the time the invention was made to select an appropriate number of pilot symbols for each of the transmission rates in the communication system of Marchetto et al, as suggested by Hassan, whereby the ratio of the number of the pilot symbols to the total number of

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symbols in a single slot of the signal becomes smaller when the transmission rate is high than it is when the transmission rate is low.

(10) Response to Argument

Appellant disputes the examiner's conclusion, derived from col. 41: 48-64 of Hassan, that "an appropriate (in other words, optimal) number of pilot symbols should be used for reducing the bit error rate." However, as correctly observed by Appellant, the cited portion of Hassan suggests that increasing the ratio of pilot symbols to total number of symbols (i.e., increasing the frequency of pilot symbols in a transmitted symbol sequence) may have the beneficial effect of increasing the accuracy of the estimated channel transfer characteristic but, at the same time, has undesirable effects of reduced channel capacity. Therefore, this teaching strongly suggests that one should limit the number of pilot symbols in a slot to a minimum such that the insertion of the pilot symbols would not overly reduce channel capacity at any of a plurality of transmission rates. The pilot symbols are to be inserted periodically in the signal for all the different transmission rates. Thus, there will be more data symbols between two space-apart pilot symbols in a higher transmission rate than in a lower transmission rate. Since there will be more data symbols between two consecutive pilot symbols in the case of high transmission rate, the ratio of pilot symbols to total symbols will be smaller than it is for low transmission rate.

Appellant states that the examiner's assertions seem to be contradictory, by saying that the examiner asserted, in one sentence, that "when a same number of pilot symbols is used for high and low transmission rates, the ratio of the optimized number of pilot symbols to the total number of symbols would have been smaller when the transmission rate is higher than it is when

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the transmission rate is lower," and, another sentence, that "it would have been obvious to one skilled in the art at the time the invention was made to select an appropriate number of pilot symbols for each of the transmission rates." However, the selection of a particular number of pilot symbols for each different transmission rate depends on a design criteria such as minimum overhead, as taught by Hassan. Thus, there is no contradiction because these statements explain that as the result of the selection of an optimized number of pilot symbols the ratio of pilot symbols to the total number of symbols would have been smaller in the case of high transmission rate than in the case of low transmission rate.

Appellant further argues that the two statements are in error, by saying that the examiner has impermissibly supplied a limitation which is not taught or suggested by the cited combination of references. However, as explained above, Hassan clearly suggests finding an "optimal" number of pilot symbols to be used at a given data rate when the patent describe the undesirable effects of increased frequency of pilot symbols at the cited portion.

Appellant is in the opinion that the examiner has relied on the "obvious to try" test of *KSR Int'l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). However, the examiner actually relied on a common engineering principle of optimization, leading to the conclusion that a higher transmission rate would require a higher ratio of pilot symbols to total symbols.

Even if the "obvious to try" test were used, one would have arrived at the same conclusion of obviousness because there are only "a finite number of identified, predictable solutions, with a reasonable expectation of success." Specifically, Marchetto et al discloses the use of at least two different transmission rates for transmitting a signal comprised of pilot

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symbols and data symbols. For two different rates, there are only three solutions are possible: higher, lower or same ratio of pilot symbols to total symbols for a high transmission rate.

Applicant also argues that Hassan never mentions seeking or determining an "appropriate" or "optimal" number of pilot symbols and Hassan apparently ignores varying the ratio of pilot symbols for different transmission rates. However, the cited portion of Hassan is in the background of the invention, describing the general usage of pilot symbols with respect to the benefits and drawbacks of increased pilot symbols in a slot. Appellant also argues that the patent teaches alternative ways of increasing the accuracy of the estimated channel transfer characteristic. However, whether the patent teaches alternative ways of increasing the accuracy of the estimated channel transfer characteristic is irrelevant. The question turns on whether one skilled in the art would have used a smaller ratio of pilot symbol to total symbols for a high transmission rate in the method and apparatus of Machette et al with the knowledge of the cited portion of Hassan.

Appellant asserts that there was no reasonable expectation of success in finding the tendency defined in the claims or that a ratio of pilot symbols to the total number of symbols being smaller when the transmission rate is high than when the transmission rate is low would be useful or beneficial. However, since there are only three solutions as discussed above, there appears to be very high expectation of success in arriving at the same invention.

For the above reasons, it is believed that appellant's arguments are not persuasive and the rejection of claims 5-10 should be sustained.

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(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Kevin Y Kim/

Primary Examiner, Art Unit 2611

Conferees:

/Shuwang Liu/

Supervisory Patent Examiner, Art Unit 2611

/CHIEH M FAN/

Supervisory Patent Examiner, Art Unit 2611